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First record of *Tantilla flavilineata* Smith & Burger, 1950 (Squamata, Colubridae) for Puebla, Mexico

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Abstract

We record *Tantilla flavilineata* Smith & Burger, 1950, for the first time in the state of Puebla, Mexico. It was previously considered endemic to a small region of the state of Oaxaca. With this record, we extend the known distribution 100 km north-northwestward in a straight line. We also provide scales counts and description of the coloration in life of a female specimen. The geographic distribution of *T. flavilineata* appears to be restricted to mid-elevations in various oak woodlands which have been limited in area by agriculture. More information on its natural history, ecology, and geographic distribution is needed to develop conservation strategies for this rare snake.

Keywords

Geographic range extension, Tehuacan-Cuicatlan Valley, Yellow-lined Centipede Snake

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Introduction

The genus *Tantilla* Baird & Girard, 1853 belongs to the family Colubridae and is the third most speciose genus in the family (67 species; Antúnez-Fonseca et al. 2020). Mexico, where 30 *Tantilla* species occur, is a center of diversification of these snakes (Wilson and Mata-Silva, 2014). The *taeniata* group includes 26 species and has the highest diversity of any group within *Tantilla* (Antúnez-Fonseca et al. 2020). The *taeniata* group is characterized, according to McCranie and Smith (2017: 338), by "the possession of dark dorsal surfaces with pale middorsal and lateral stripes, and by having a pale nuchal collar. Those stripes are occasionally reduced to dashes or dots in a few species, and the nuchal collar is complete, incomplete, or reduced in a few species." The snakes of the *taeniata* group are distributed from Oaxaca, Mexico, to northwestern Colombia, with 11 species inhabiting Mexico (Antúnez-Fonseca et al. 2020).

Tantilla flavilineata Smith & Burger, 1950 (Yellow-lined Centipede Snake) is a member of the *Tantilla taeniata* group (Wilson and Meyer 1971). This species was

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described based on six specimens from "8 miles southeast of Nochixtlán, Oaxaca, Mexico", and it was thought to have a distribution restricted to the state of Oaxaca. This species is characterized by having two pale lateral stripes and a light-colored median stripe, a pale uninterrupted nuchal collar, 152–168 ventral scales, and 43–56 subcaudal scales, as well as other scutellational characters (Wilson and Mata-Silva 2014). This snake species, which is fossorial and nocturnal, is uncommonly found in oak forest on rocky slopes at elevations of 1,890–2,438 m (Canseco-Márquez and Gutierrez-Mayen 2010; Wilson and Mata-Silva 2014). The International Union for Conservation of Nature's (IUCN) Red List of Threatened Species classifies this snake as Endangered because its extent of occurrence is less than 5,000 km² and the localities where it has been recorded are affected by fragmentation and deforestation (Canseco-Márquez 2007). The Mexican law NOM-059-SEMARNAT-2010 considered this snake Threatened (SEMARNAT 2010), and the Environmental Vulnerability Score determined for this species is high (EVS: 14; Wilson et al. 2013).

Herein, we report the first locality for *T. flavilineata* from the Mexican state of Puebla. Our new record extends the known geographic distribution to the north by over 100 km from the closest known locality.

Methods

Field surveys were conducted in Cacaloapan municipality, Puebla, Mexico, by three authors (AICC, CO, and RAV) on a regular basis since January 2021. Specimens collected were euthanized with pentobarbital, fixed with 10% formalin, and preserved in 70% ethanol for permanent storage. The specimen of *T. flavilineata* was deposited at the Colección Nacional de Anfibios y Reptiles, Instituto de Biología, Universidad Nacional Autónoma de México (CNAR). Specimen identification was verified using the key to the *Tantilla taeniata* group by Antúnez-Fonseca et al. (2020) and data provided in the original description of *T. flavilineata* (Smith and Burger 1950). Color pattern was described using the color codes defined by Köhler (2012). We used digital calipers to take measurements to the nearest 0.1 mm.

Results

***Tantilla flavilineata* Smith & Burger, 1950**
Figure 1A

New record. MEXICO – **Puebla** • Cacaloapan, 9.6 km SE of Cacaloapan; 18.5438°N, 097.6686°W; 2430 m elevation; 22.XII.2021; Angel I. Contreras Calvario leg.; under a stump of *Dasylirion lucidum* in a rocky area in an oak forest; 1 ♀ adult, IBH 34223.

Description. An adult female, snout–vent length 113.87 mm, tail length 25.68 mm, total length 139.55 mm, and tail/total length ratio 0.22. Dorsal scales in 15-15-1 5 rows, all scales smooth, with no apical pits; ventral scales 167; anal plate divided; subcaudal scales 49 + cornified caudal tip; 7 supralabials on both sides, last scale much the largest; the second supralabial in contact with prefrontal; 6 infralabials on both sides, fourth much the largest; 2+2 temporal scales, both about twice as long as broad; 2 postocular scales; postnasal scales in contact with the preocular scale; first pair of infralabial scales slightly separated by the mental scale; third and fourth supralabial contacting the orbit. Background body color in life Pale Neutral Gray 296; nuchal collar a little longer than thickness of a dorsal scale and Pale Buff 1; middorsal stripe encompassing vertebral scale line Cream White 52; lateral stripes Dark Neutral Gray 299; ventral scales Amber 51 with edges Flame Scarlet 73 (Fig. 1B).

Identification. The specimen (IBH 34223) is identified as *T. flavilineata* based on the following characters: a small snake with a pale middorsal stripe occupying

Figure 1. *Tantilla flavilineata* and habitat in Cacaloapan municipality, dominated by *Quercus* sp., in association with *Yucca periculosa*. **A.** Specimen IBH 34223 in life. **B.** Ventral view and subcaudal area of the specimen showing the reddish coloration. **C.** Habitat.

vertebral scale row and adjacent halves of paravertebral scale rows and a pale lateral stripe occupying row 4 and adjacent halves of rows 3 and 5; a diffuse dark stripe on the center of most dorsal scales rows; pale nuchal collar complete and crossing ultimate supralabial; no loreal; dorsal scales in 15-15-15 rows, and fewer than 56 subcaudals (49).

Discussion

Previously, the presence of four species of the genus *Tantilla* was reported in Puebla: two in the Valle de Tehuacán-Cuicatlán (*T. bocourti* [Günther, 1895] and *T. rubra* Cope, 1875; Canseco-Márquez and Gutiérrez-Mayén 2010), one in the Sierra Norte region (*T. robusta* Canseco-Márquez, Mendelson & Gutiérrez-Mayén 2002; Canseco-Márquez et al. 2002), and one more in the Sierra Madre del Sur (*T. calamarina* Cope, 1866; García-Vázquez et al. 2009). Our new record added one more species for Puebla, extending the known distribution of *T. flavilineata* 108.02 km north-west in a straight line from the nearest locality (reported as "4 Km E of San Miguel Huautla"; Canseco-Márquez and Gutiérrez-Mayén 2010; Fig. 2).

Tantilla flavilineata is a very rare species with a distribution restricted to intermediate elevations in oak forest (Wilson and Mata-Silva 2014). Our single record corroborates the rarity of this snake, which is restricted elevation and vegetation type throughout its distribution. During the sampling period, only the specimen reported here was found, in an ecotone of *Quercus* sp. forest in association with *Yucca periculosa* (Fig. 1C). The geographic distribution of *T. flavilineata* appears to be restricted to mid-elevations through different oak forest associations (Wilson and Mata-Silva 2014), since all known specimens, including our new record, have been recorded in this type of vegetation. The three classification systems, IUCN Red List, Mexican regulations (NOM-059), and the Environmental Vulnerability Score, suggest that this snake is at risk of extinction.

Although practically the entire distribution of *T. flavilineata* is inside of the Valle de Tehuacan-Cuicatlan Biosphere Reserve, our record is outside of this natural reserve. The oak forest, which is the habitat of *T. flavilineata*, represents 15.44% of the total surface of this protected natural area, and the main threat that has led to the loss of preserved oak forests is agriculture (CONANP 2013). This implies the need to obtain more information on its natural history, ecology, and geographic distribution for the development of conservation strategies for this rare snake.

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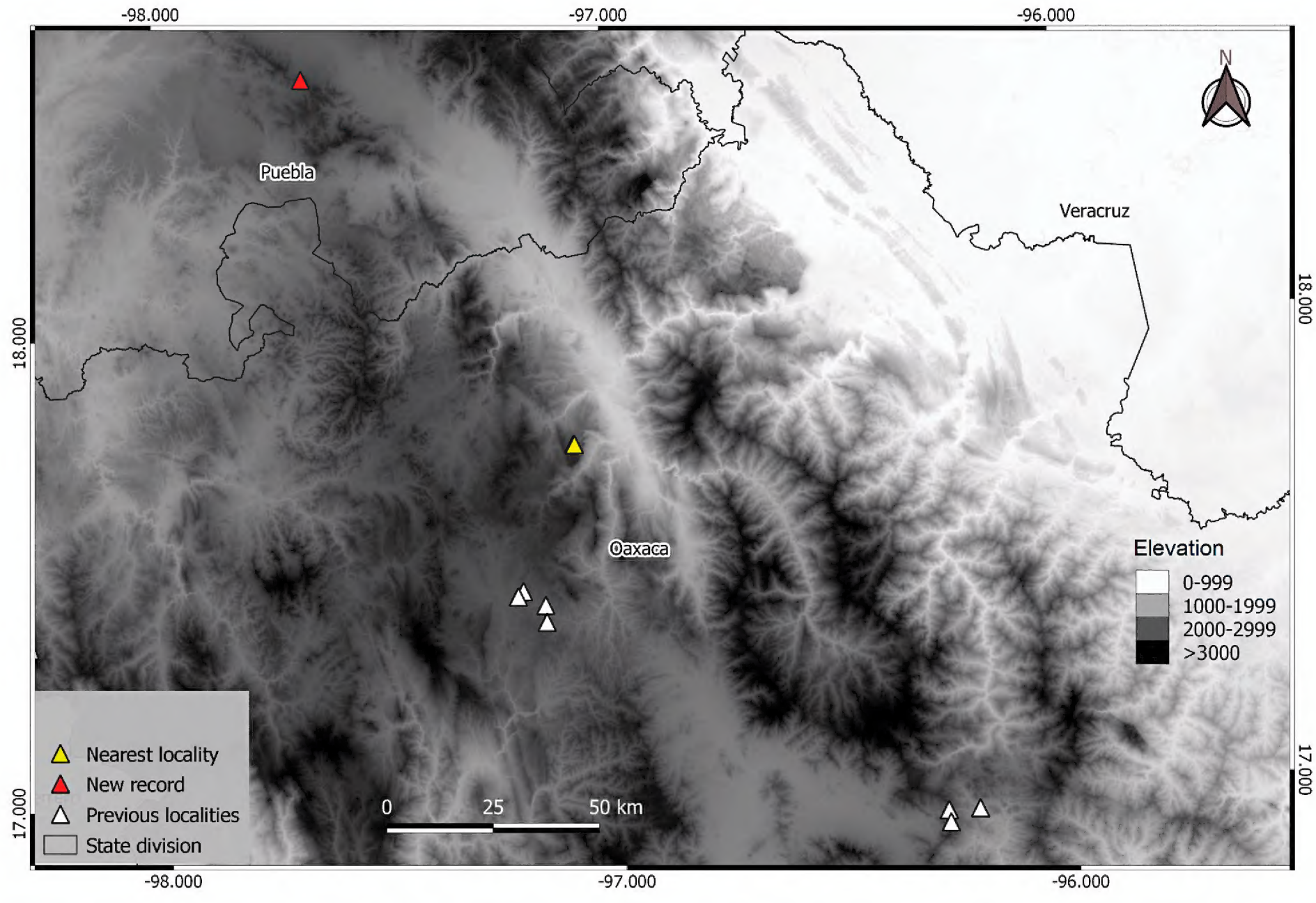

Figure 2. Known localities of *Tantilla flavilineata* in the states of Oaxaca and Puebla, based on our new record (red triangle) and published sources (Smith and Burger 1950; Canseco-Márquez and Gutiérrez-Mayén 2010).

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Authors' Contributions

Conceptualization: AICC, RAV, CO, VHJA. Data curation: AICC, RAV, VHJA. Formal analysis: AICC, VHJA, RAV. Funding acquisition: AICC, RAV, CO, VHJA. Investigation: AICC, RAV, CO, VHJA. Methodology: AICC, VHJA, RAV, CO. Resources: AICC, VHJA, CO, RAV. Writing – original draft: AAICC, RAV, CO, VHJA. Writing – review and editing: AICC, RAV, VHJA.

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